Newsletter for October 2022

……

Maintainability Update of the Anatomy Re-engineering Framework

By Lathreas | October 27, 2022

As you might know, our Anatomy Re-engineering Framework project recently moved to Blender as our underlying tool. In our last blog post, we mentioned one of the remaining technical hurdles that was in the way of scalable development using Blender. In this newsletter article we would like to highlight some major progress in resolving this, which clears the road for a maintainable and reliable program. It'll be a bit technical this time for that reason, but I'm sure that this will pay off for our future updates.

Geoscript

In brief, Blender's Geometry Node tree system, which forms the main building block for our computational anatomy logic, is stored in a binary format. Because of that, reviewing and maintaining the logic on Github is very difficult, since the node trees don't show up as code, as some of you have rightfully noticed in our Github repository as well.

To resolve our issue, we took inspiration from an addon called "Node Tree Source". This Blender addon converts node trees into Python files containing all properties of the node tree, allowing us to display these properties in Github much more easily.

Unfortunately, this tool would generate thousands of lines of mostly redundant properties to represent even one of the simplest of our node trees, and doesn't display the logic that the node tree represents.

As such, we decided to develop a wrapper around Blender's Geometry Nodes system, which we tentatively call "Geoscript" for short, which allows us to represent the node tree's logic as Python code. This allows us to write just a few lines of intuitive code to represent very complex trees. For example, a linear interpolation function (that would have produced about 4000 lines of code using Node Tree Source) can now be represented in just three lines!

```
@geometry_function
def lerp(vector1: Vector3, vector2: Vector3, mix: Scalar) -> Vector3:
    return (1.0 - mix) * vector1 + mix * vector2
```

We're now using Geoscript to convert the node trees in our addon to clear and intuitive code. As an added bonus, we can now perform type checks and add constraints that weren't possible before, making our tool much more robust and verifiable.

Mypy, Pylint, Black, and Pytest

Now that we're full speed ahead with coding in Python, we can put some special emphasis on code quality and maintainability to catch bugs before they become a problem. We've annotated the code base with type checks, allowing the type linter 'mypy' to check our code for type errors without running the code. 'Pylint' checks for code style issues, and we format our code with 'black'. We have also implemented a unit test framework with 'pytest' that works with Blender.

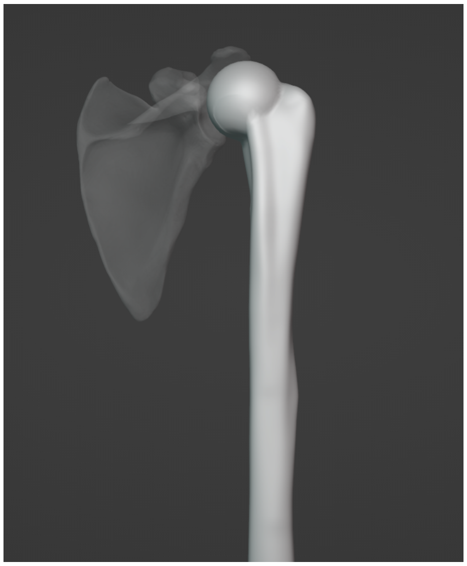
Volumetric Fields and Hair Geometry Nodes

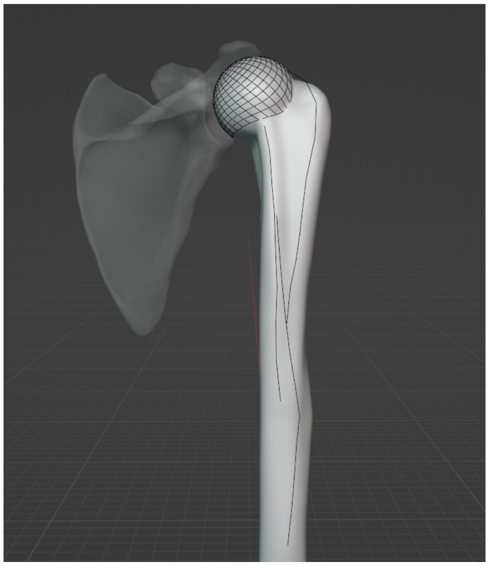
Recently, Blender 3.3 LTS released! This adds some great new nodes for us to use, which we had been waiting for. In particular, we can now use 'volumetric fields', which was a prerequisite for us to create isosurfaces that have formed an important part of our bone generation model.

In addition to that, they added support for Hair Particle Geometry Nodes, which would allow us to mathematically define and test hair follicle distributions. That will be useful later down the line once we start working on the skin generation system and want to use it to answer questions about required fur properties - something that we'll be covering in the Integument Review project as well.

New Features

Although it wasn't our main focus for these two months, we have been able to add some new features to the system! This time, we have added a system to define 'tubercles' on bones. Tubercles are protrusions in bones that are an important structural feature at bone-muscle interfaces. In the pictures below and right, you can see how our addon generates the deltoid tuberosity, the greater tubercle and the lesser tubercle in the upper arm, using input data represented by the black lines. (The ball-and-socket joint is also visible.)





We're also actively designing a system for the weirder types of bones in our bodies, such as the scapula (shoulder blade). The scapula shown above is currently a placeholder non-parametric mesh, which we will slowly parametrize so that it is fully functionally editable like the humerus. Our plan is to mimic the development of such a bone by taking the pulling forces and genetic signals partially into account. There are still a few questions that we will have to experiment with, so we will let you know in detail in one of the next updates! Once we have tacked this bone, we will be one step closer to being able to model the face (so that we can work on designing snoots - something I'm personally excited for).

Looking Forward

All in all, lots of progress behind the scenes. We are going to be polishing the code base further in the upcoming few weeks to make it easier for new developers to join, and we are hard at work to get a good demonstration of the full system operational before the beginning of December. Stay tuned!

Brief YTD Financial Update

By Serathin | October 28, 2022

Our Year to Date financials have seen a decrease in both spending and income, mainly due to the fact that we have cut off a major expenditure source. With this, our expenses will be much more baseline and we can see a more manageable budget to be formed when it comes not only to now but 2023. We have an outlier in the form of a major donation that has come in through PayPal and will actually cover several major projects that we plan on starting up.

Our total income was $6,641.95 for January through March, $9,925.68 for April through June, $3,906.66 for July through September, and $10,010.31 for October, which is a year-to-date total of $30,484.60. $10,612.00 of that came from Patreon, while $19,858.55 was from personal donations, with miscellaneous sources making up the remaining $14.05.

Our total expenses were $8,855.71 for January through March, $7,715.65 for April through June, $2,255.26 for July through September, and $0.00 for October so far, which is a year-to-date total of $18,826.62. These expenditures include things such as projects, online hosting, editing, contractors, advertising, utilities, legal fees, and other miscellaneous sources.

The difference between income and expenses for the year so far has left us with a net gain of $11,657.98, which will be used for Q4 expenses and current and future projects.

As we look to the future, the financial hub of the FFF will be looking at growth models for the budgets in 2023 and looking for increased income through Patreon and personal donations.

Public Perception of the Freedom of Form Foundation

By Ellie | October 29, 2022

The Freedom of Form Foundation isn't exactly the most well-known of organizations. We've got just over 1.3k followers on Twitter, we're only a couple of years old, and most people in our target market haven't even heard of us. It's safe to say that, even though we're growing, public perception of the FFF is mostly nonexistent. We're small, but we're scrappy, and we're taking the chance to put our best foot (or paw) forward.

Of the people that do know about us, which is mostly therians, transhumanists, furries, and the like, almost everyone I've seen seems to like us, which is great. These groups are whom we're targeting for early and widespread adoption, so support and acceptance from them is critical. The organization's vision is met with mostly universal admiration, although concerns about feasibility and strategy do occur in varying degrees. We welcome this criticism, since it helps us to know what people care about and where we can improve. We're doing this for everyone out there who wants morphological freedom, so it's important that they like what we're doing.

The goal of the FFF is lofty but inspiring, and while we do encounter a lot of skepticism, people want us to succeed. I think one of my favorite responses to someone talking about the Foundation on Twitter was simply the gif of Hawkeye standing in the rain, saying "Don't do that. Don't give me hope." We're working to achieve a dream that people have had for years, and they're finding out that it just might be possible. Encouraging that hope is one of our best strategies for gaining support, and I think we've been doing a pretty good job of it with our progress so far.

The Outreach team has been doing a lot to bolster the public perception of the Freedom of Form Foundation, and we've got even more in the works. There's a thriving community Discord server with project updates, discussions both theoretical and technical, and even fun events put on by the moderation team. Our Twitter, while relatively small, is growing, especially when we put out a new project update. It turns out that when you tell people "Here's what we're going to do, and he're how we're going to do it," they get pretty excited. Our podcast has fun discussions, and there have been a lot of interviews with notable people in the therian and transhumanist communities. We haven't got Chise on yet, but judging by the number of times people have asked her when they're going to be able to become anthros, that would be a very well-watched interview.

I think everyone reading this is familiar with how the general public views the furry community. Let's be honest, even though we're working on morphological freedom for *everyone*, the Freedom of Form Foundation does fall under the "furry" category, for the most part. While it seems like the public is slowly shifting closer and closer to acceptance in recent years, there's still a lot of stigma attached to the community, and that can be difficult to combat. Being a nonprofit helps people to feel more secure about what we're doing and the fact that we're serious, but we've still got a long way to go before everyone knows about and accepts us. I dearly hope that the Foundation does eventually grow to the point where it could be considered well-known, but only time will tell how the general populace will react. We're slowly preparing for that day, and hopefully the world will like what it sees.

Welcoming Hyper to our Moderation Team

By Hyper the Bunny | October 22, 2022

Howdy! I'm Hyper (she/her), a Cascadian currently attending community college in Seattle. I hope to someday become a biomedical engineer and take on more technical positions in the FFF. I'm currently volunteering as a moderator and event organizer. I only just joined back in July, but so far I've helped plan and host a variety of monthly events, like a VRChat meetup. I joined the FFF because I'm passionate about building the future we want to see and not let our unique identities be crushed by the status quo. I enjoy interacting with y'all, making friends, and building this wonderful community that we are so lucky to have. So feel free to message me or join one of the upcoming events :D